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Studies in the genus Lupinus—V. The Sparsiflori

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(WITH FOURTEEN TEXT FIGURES)

INTRODUCTION

The Californian annuals of the subgenus *Lupinus* have long been recognized as separating into two divisions, the verticillate-flowered forms and those with flowers not in verticils. As already shown by me (Bull. Torrey Club **46**: 390), this classification holds good in the subgenus *Platycarpos*, if one exception is provided for. It likewise may be applied to the annuals and biennials of North America in general, north of Panama, but breaks down in the *Micranthi*, a large assemblage of variations usually with real verticils. Serious study of the material examined prompts recognition of at least five groups, only one of which will be treated in this paper. These groups will include the so-called biennials of Texas and adjacent Mexico. My classification contrasting these groups will be presented in a subsequent paper.

The following published names appertain to plants here assigned to the *Sparsiflori:*

L. hirsutissimus Benth. Trans. Hort. Soc. II. **1**: 141. 1835.

L. leptophyllus Benth. *Ibid.* II. **1**: 141. 1835.

L. truncatus Nutt.; Hooker & Arnott, Bot. Beechey Voy. 336. 1840.

L. sparsiflorus Benth. Pl. Hartw. 303. 1848.

L. concinnus arizonicus Wats. Proc. Am. Acad. **8**: 537. 1873.

L. arizonicus Wats. *Ibid.* **12**: 250. 1876.

[The BULLETIN for October (**47**: 441–486) was issued October 29, 1920.]

L. citrinus Kell. Proc. Cal. Acad. Sci. I. **2**: 192. 1877.

L. Pondii Greene, Pittonia **1**: 288. 1899.

L. deflexus Congdon, Muhlenbergia **1**: 38. 1904.

L. Benthami Heller, *Ibid.* **2**: 61. 1905.

L. subhirsutus Davidson, Bull. So. Cal. Acad. Sci. **18**: 80. 1919.

L. arizonicus Wats. was proposed to replace *L. concinnus* var. *arizonicus* Wats., and *L. Benthami* Heller is a proper substitute for *L. leptophyllus* Benth., since the latter was published five years later than the Mexican *L. leptophyllus* Schl. & Cham. Instead of ten, however, I recognize only six species, one of these being extremely variable and exhibiting marked variation in several directions.

The home of these plants is mainly in southern California, from Monterey Bay and El Dorado County to northern Lower California; but certain variations of *L. sparsiflorus* extend southward to the tip of Lower California, including some of its adjacent islands, and others spread eastward over the Mexican Plateau region of Arizona, etc.

The principal diagnostic characters of this group are: annuals with non-verticillate flowers, racemes 2–30 cm. long, longer than their supporting peduncles; keel petals ciliate below near the claw and commonly also ciliate above.

Key to the species of the Sparsiflori

Largest leaflets 15–20 mm. wide; plants conspicuously hispid with stinging hairs mainly 3–5 mm. long. 1. *L. hirsutissimus.*
Largest leaflets 2–12 mm. wide; plants not obviously hispid, the the hairs not over 2 mm. long.
  Flowers obviously ascending after anthesis. 2. *L. sparsiflorus.*
  Flowers spreading or drooping after anthesis.
    Leaflets truncate at apex, entire, notched, or three-toothed.
      Leaflets cuneate-oblong, petioles terete. 2. *L. sparsiflorus.*
      Leaflets linear, petioles usually flattened. 3. *L. truncatus.*
    Leaflets angled at apex, mostly acute.
      Matured pods ascending; petals blue and purple. 4. *L. Benthami.*
      Pods deflexed; petals not blue.
        Plants 1–2 dm. tall; petals orange or golden; pods two-to four-seeded. 5. *L. citrinus.*
        Plants 2–4 dm. tall; petals white or pinkish; pods five-to eight-seeded. 6. *L. deflexus.*

1. LUPINUS HIRSUTISSIMUS Benth. Trans. Hort. Soc. II. 1: 141. 1835. [FIG. 53.]

Stout, 2–5 dm. tall, the very stiff hairs 3–5 mm. long and nettle-like; leaflets five to eight, broadly cuneate-obovate, 15–20 mm. wide, 20–50 mm. long; racemes 15–25 cm., flowers about 14 mm. long, spreading, pedicels 3–4 mm. long; calyx with stiff spreading hairs, the upper lip about 6 mm. long, bifid, the lobes slender, acuminate, 3 mm. wide, lower lip entire and acuminate or three-toothed, 8–9 mm. long, 4 mm. wide; petals dark or light purple, banner nearly orbicular, including the claw about 14 x 14 mm., wings about 14 x 8 mm., keel stout, straight, ciliate at the free edges below, naked above; pods 20–30 mm. long, stiffly hirsute like the rest of the plant, ovules about seven; seeds about 3 mm. long, thin, pale and obscurely marked or densely marbled with dark brown.

This is, perhaps, the most sharply contrasted annual lupine of southern California, its long stinging yellow trichomes setting it apart as unique. Once known, it should never be confused with any other species, not even the stiffest-haired forms of *L. sparsiflorus*. The original description, though certainly abbreviated, leaves no doubt as to the identity of the species. I quote a few clauses, as follows:

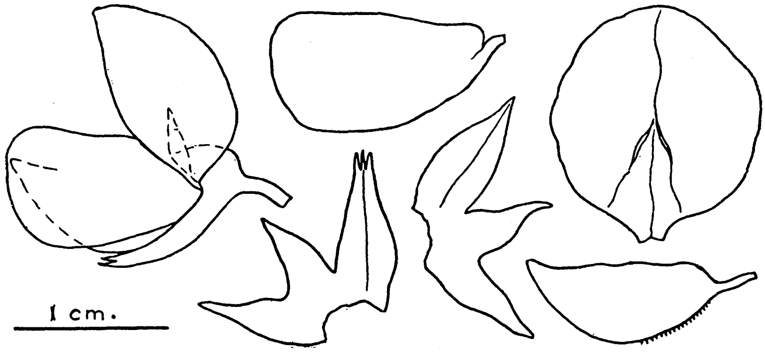

FIG. 53. LUPINUS HIRSUTISSIMUS Benth. *E. A. McGregor 703* (CPS).

> L annuus, undique pilis longis rigidis patentibus hirsutissimus . . . foliolis obovatis mucronulatis . . . flowers reddish-purple.

CALIFORNIA. Los Angeles County: Claremont, March, 1897, *H. P. Chandler* (UC); same, May, 1909, *C. F. Baker 5358* (B, G, NY, US, CPS); Glendora, May, 1902, *G. B. Grant 727* (B);

Los Angeles, *Miss E. D. Palmer* (UC); Pasadena, May, 1886, *Julia A. Meeker* (B); same, March, 1893, *A. J. McClatchie* (NY); Pomona, April, 1902, *E. Braunton 224* (US); San Clemente Island, June, 1903, *B. Trask 255* (NY, US); same, May, 1916, *K. Brandegee* (UC); Santa Catalina Island, Avalon, May, 1898, *B. Trask* (US); Santa Catalina Island, March, 1901, *B. Trask* (NY); Santa Monica Forest, March, 1897, *J. H. Barber 57* (B, G, UC); Santa Monica, Rustic Canyon, Feb., 1900, *C. A. Colmore* (UC). Monterey County: Little Sur River, May, 1901, *J. B. Davy 7372* (UC); Santa Lucia Mountains, San Migueleta ranch, May, 1897, *A. Eastwood* (G); Santa Lucia Mountains, Willow Creek, March, 1898, *R. A. Plaskett 64* (G, NY, UC). Riverside County: Elsinor, April, 1892, *A. J. McClatchie* (NY). San Benito County: San Juan, May, 1903, *A. E. D. Elmer 4732* (NY, US). San Bernardino County: Cajon Hills, April, 1891, *G. W. Dunn* (RM); Mentone, April, 1898, *J. B. Leiberg 3288* (US); Redlands, May, 1906, *L. A. Greata* (B); San Bernardino Mountains, May, 1880, *G. R. Vasey 94* (US); same, April, 1906, *S. B. Parish 5665* (RM); San Bernardino foothills, May, 1885, *S. B. & W. F. Parish 144* (UC US); same, April, 1888, *S. B. Parish* (UC); San Bernardino, May, 1894, *S. B. Parish* (US); San Bernardino hills, May, 1898, *S. B. Parish* (NY); near San Bernardino, March, 1901, *S. B. Parish 4658* (NY, US); same, April, 1903, *S. B. Parish 5185* (B); San Bernardino valley, May, 1909, *S. B. Parish 7086* (UC); Waterman Canyon, June, 1894, *S. B. Parish 3493* (US). San Diego County: Fallbrook, Moro Hill, *L. R. Abrams 3337* (G, NY, US); Jacumba, April, 1889, *C. R. Orcutt* (US 21034, right-hand specimen); Julian, Laguna Mountains, June, 1918, *E. A. McGregor 703* (CPS); La Jolla, Howard Canyon, March, 1914, *F. S. & E. S. Clements 152* (G); San Diego, May, 1862, *J. G. Cooper 539* (US); same, March, 1885, *C. R. Orcutt* (T); same, March, 1892, *O. W. Knight 2325* (G); same, March, 1901, *K. C. Brandegee* (UC); same, May, 1906, *T. S. Brandegee* (B, NY); San Pasqual, May, 1852, *G. Thurber 610* (G, NY, T); San Ysabel, April, 1893, *H. W. Henshaw 130* (US); Witch Creek, May, 1894, *R. D. Alderson* (UC). San Luis Obispo County: San Luis Mountain, Feb., 1886, *Mrs. R. W. Summers*

(G, NY, UC); San Luis Obispo, spring, 1905, *J. E. Roadhouse 34* (UC). Santa Barbara County: Cuyama River, May, 1896, *A. Eastwood* (G); San Rafael Mountains, June, 1887, *H. C. Ford* (G); Santa Barbara, March, 1861, *W. H. Brewer 316, 340* (G, US); Santa Cruz Island, April, 1888, *T. S. Brandegee* (UC); Santa Inez Mountains, March, 1828 (UC). Santa Cruz County: near Santa Cruz, *C. L. Anderson* (UC). County not given: Santa Ana River, April, 1880, *Parish Brothers* (B); 1876, *C. C. Parry & J. G. Lemmon 63* (G, T); *Dr. Coulter 373* (T); April, 1884, *Mrs. R. W. Summers* (US).

LOWER CALIFORNIA. Cariso Creek, April, 1893, *T. S. Brandegee* (UC); Guadalupe Mountains, May, 1883, *C. R. Orcutt 880* (NY); Laguna to Tia Juana River, June, 1894, *E. A. Mearns, International Boundary Commission 3505* (NY); San Telmo, April, 1886, *C. R.Orcutt* (UC).

2a. LUPINUS SPARSIFLORUS Bent. Pl. Hartw. 303. 1848. [FIG. 54.]

Lupinus subhirsutus Davidson, Proc. So. Calif. Acad. Sci. **18**: 80. 1919.

This is a composite species exhibiting several pronounced variations, which, in their extremes, readily lend themselves to a scheme of classification. Numerous intermediates occur, however, and comparative study shows the advisibility of recognizing a series of varieties here, rather than several new species not at all equal in rank to *L. hirsutissimus*, *L. Benthami*, *L. truncatus.*, etc.

From Bentham's description I quote the following:

> Pili patentes cum aliis appressis mixta . . . Flores iis *L. nani* subsimilis, omnes alterni v. rarius hinc inde approximati.

My conception of the species, both *sensu lato* and *sensu stricto*, is indicated by the following diagnosis, the italics emphasizing the characters not shared by the typical form.

Stems slender or *stouter and more or less fistulous*, usually branched, appressed-pubescent and usually more or less villous, the spreading hairs some 1–2 mm. long, either soft or quite stiff; leaflets five to nine, linear, oblanceolate, *cuneate*, *cuneate-oblong*, or *elliptic*, angled, *truncate*, or *notched* at the apex, somewhat hairy or almost glabrous above, usually villous below, petioles terete: flowers 8–13 mm. long, promptly and conspicuously becoming suberect as the petals wither and the ovaries enlarge; petals bright blue or *pale purplish*, banner suborbicular with poorly defined claw or *somewhat longer than wide and abruptly contracted into a well-defined claw*, keel petals short ciliate, rarely naked, at the free edges below, naked or sparsely ciliate above; pods ascending, about six-ovuled; seeds some 2–3 mm. long, angled, dotted or marbled on a pale ground.

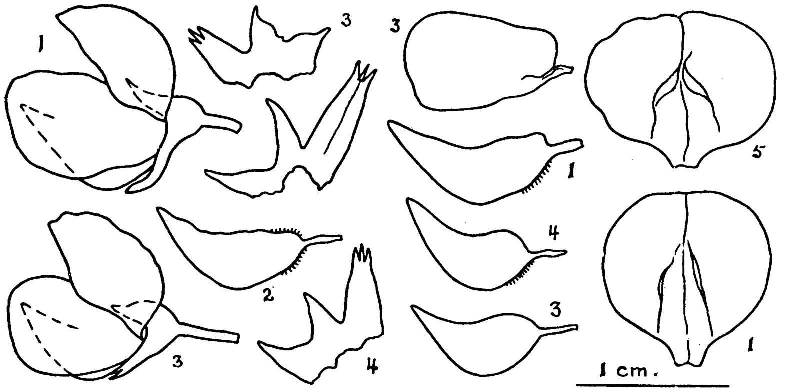

FIG. 54. LUPINUS SPARSIFLORUS Benth. 1. *C. F. Baker 5357* (CPS); 2. *J. Grinnell* (US 614572); 3. *F. S. Daggert* (G. L. Moxley); 4. *H. M. Hall 5759* (UC); 5. *I. Tidestrom 867* (US).

After much deliberation, I am still unable to accept Dr. Davidson's *L. subhirsutus* as of even varietal rank. That the keel, as stated by him, is really non-ciliate, has been verified by my dissection of flowers from a type-duplicate specimen in the collection of Mr. Geo. L. Moxley, of Los Angeles. However, the keel is normally ciliate in Dr. Hall's specimens (UC) from Palm Springs, the type locality of *L. subhirsutus*. That *L. sparsiflorus* is quite variable at Palm Springs is shown by the fact that, before Dr. Davidson's description was published, I had listed certain specimens from there as var. *arizonicus*, and others as var. *barbatulus*. The distinction as to nodose and non-nodose hairs I I have not yet been able to appreciate.

As indicated further by key, the varieties here recognized are distinguished by stem and leaflet characters, the often evident differences in amount and length of the spreading hairs being rejected as quite unsatisfactory for diagnostic use within the limits of this species. Each of these varieties could in turn be subdivided into obviously villous forms and appressed-pubescent or glabrate forms; but too many specimens are intermediate in this respect and too few are really typical of the extremes.

Specimens assigned to the species, *sensu stricto*, are:

LOWER CALIFORNIA. Punta Gorda, April, 1892, *T. S. Brandegee* (G, UC, US).

CALIFORNIA. Los Angeles County: Antelope Valley, May, 1896, *J. B. Davy 2323* (UC); Azusa, San Gabriel Wash, March, 1906, *J. Grinnell* (US); Chatsworth Park, San Fernando Mountains, April, 1901, *L. R. Abrams 1344* (G); Claremont, April, 1904, *C. F. Baker 4103* (UC); same, May, 1909, *C. F. Baker 5357* (CPS); Elycian Hills, near Occidental College, Feb., 1903, *E. Braunton* (UC); Garvanza, April, 1901, *G. B. Grant* (US); Garvanza, April, 1902, *H. M. Hall 2939* (B); Llano Verde foothills, May, 1896, *J. B. Davy 2325* (UC); Los Angeles, March, 1880, *J. F. James* (US); same, 1884, *J. C. Nevin 22a* (G, UC); same, May, 1903, *E. D. Palmer* (UC); Newhall, Oct., 1884, *J. C. Nevin 22b* (G); Pasadena, March, 1880, *J. F. James* (US); same, March, 1893, *A. J. McClatchie* (US); same, Feb., 1903, *G. B. Grant* (B); same, May, 1904, *G. B. Grant* (RM, UC); Pomona, April, 1897, *J. H. Barber 141* (G, UC); San Pasqual, May, 1852, *G. Thurber* (G); Saugus, May, 1889, *K. Brandegree* (UC); Sierra Madre, Mt. Wilson trail, June, 1914, *C. P. Smith 2877* (CPS). Orange County: San Juan, April, 1903, *L. R. Abrams 3277* (G, UC, US). Riverside County: Coahuilla foothills, April, 1902, *H. M. Hall 2903* (UC); Corona, April, 1915, *C. N. Collins & J. H. Kempton 11* (US); Cottonwood Pass, May, 1905, *H. M. Hall 5999* (B, UC); Elsinore, April, 1892, *A. J. McClatchie* (NY); Midlands, April, 1903, *H. M. Hall 3846* (G); Palm Springs (Agua Caliente), April, 1896, *S. B. Parish 4080* (NY); Palm Springs, April, 1919, *F. S. Daggert* (flowers from G. L. Moxley's type-duplicate of Davidson's *Lupinus subhirstus*); same, April, 1905, *H. M. Hall 5759* (UC); Riverside, April, 1902, *H. M. Hall 2939* (B, NY, RM, UC, US); same, April, 1903, *Charlotte M. Wilder* (UC); San Jacinto, 1890, *Mrs. Gregory* (UC); Winchester, April, 1897, *H. M. Hall* (UC). San Bernardino County: Cajon Pass, April, 1902, *H. M. Hall 3007* (UC); Colton, April, 1882, *M. E. Jones 3333* (NY, RM, US); Fort Mojave, Feb., 1861, *J. G. Cooper* (UC); Mojave Desert, bordering hills, May, 1882, *C. G. Pringle* (G, T, US); Redlands, April, 1897, *Mrs. A. P. Maynard* (UC); San Bernardino, May, 1880, *G. R. Vasey 102* (US); same, May, 1886, *S. B. & W. F. Parish 946* (G, NY); same, April, 1888, and May, 1893, *S. B. Parish* (UC); same, April, 1901, *S. B. Parish* (NY); same, April, 1903, *S. B. Parish 5195* (B); same, April, 1906, *S. B. Parish 5578* (RM); San Gorgonio Pass, April, 1898, *J. B. Leiberg 3235* (US). San Diego County: Colorado Desert, April, 1889, and April, 1890, *C. R. Orcutt* (US); same, April, 1905, *T. S. Brandegee* (US); Jacumba, April, 1889, *C. R. Orcutt* (US); Sweet-water Valley, May, 1888, *G. C. Deane* (G); Witch Creek, *R. D. Alderson* (UC). Ventura County: Ojai Valley, April, 1896, *F. W. Hubby 35* (UC.).

NEVADA. Clark County: Mica Springs, April, 1894, *M. E. Jones 5064p* (NY, UC, US).

ARIZONA. Maricopa County: Valley Hassayampa, 1876, *E. Palmer 581* (UC). Pima County: Redington to Tanque Verde, March-April, 1903, *D. Griffiths 3781* (US); Santa Catalina Mountains, April, 1908, *J. N. Rose 11809* (US); Santa Rita Forest, March-April, 1903, *D. Griffiths 3800* (US); Tucson, 1905, *Desert Botanical Laboratory* (US); Tucson to Steam Pump, March-April, 1903, *D. Griffiths 3627* (US); Tucson Mountains, March-April, 1903, *D. Griffiths 3482* (US); same, April, 1892, *J. W. Toumey* (US 211805). Pinal County: Dudleyville, March-April, 1903, *D. Griffith* 3715 (US). Santa Cruz County: Calabasas, April, 1908, *I. Tidestrom 867*, (US). County not determined: 1876, *E. Palmer 581* (US 20990); Saginaw Mine road, March, 1901, *D. Griffiths 2493* (NY); Willow Spring Mountain, March-April, 1903, *D. Griffiths 3649* (US).

Key to the varieties of Lupinus sparsiflorus

Leaflets truncate or rounded at apex, entire, notched emarginate, or three-toothed.
  Plants branched about the middle; racemes lax, 6–15 cm. long. 2*f*. var. *inopinatus.*
  Plants branched at or near the base; racemes compact, 2–8 cm. long. 2*g*. var. *Pondii.*
Leaflets angled at apex.
  Largest leaflets 6–12 mm. wide; stems usually stout, 4–10 mm. thick and fistulose or succulent; racemes 8–30 cm. long, petals pale lilac or violet.
    Leaflets mostly six to nine, broadest near the apex. 2*d*. var. *barbatulus.*

Leaflets mostly five (four to six), broadest near the middle. 2*e*. var. *insignitus*.
Largest leaflets 2–4 mm. wide.
  Stems stout and fistulose; petals pale lilac or purplish. 2*c*. var. *setosissimus*.
  Stems slender, 3–4 mm. thick, hardly succulent or fistulose; racemes 6–15 cm. long, petals usually bright blue.
    Flowers 8–10 mm. long. 2*b*. var *arizonicus*.
    Flowers 11–13 mm. long. 2*a*. typical *sparsiflorus*.

2*b*. **Lupinus sparsiflorus arizonicus** (Wats.) comb. nov. [Fig. 55.]

Lupinus concinnus arizonicus Wats. Proc. Am. Acad. **8**: 537. 1873.

Lupinus arizonicus Wats. *Ibid.* **12**: 250. 1876.

Differs from *L. sparsiflorus* Benth. only in reduced stature and in size of flowers, which are from 8–10 mm. long; pubescence as in the typical plant, limited to short subappressed hairs or with few to abundant longer spreading hairs.

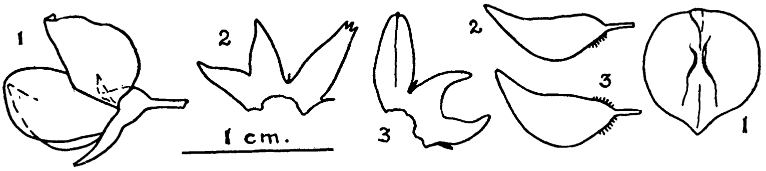

FIG. 55. LUPINUS SPARSIFLORUS ARIZONICUS (Wats.) C. P. Smith. 1. *M. E. Jones 5051* (US); 2. *M. Tuck* (US 348958); 3. *Rose, Standley & Russell 15090* (US).

Through intermediates its relationship to both the typical form and var. *barbatulus* is evident.

ARIZONA. Cochise County: Camp Lowell mesas, April, 1881, *C. G. Pringle* (NY, US); Benson, April, 1905, *T. E. Wilcox* (US). Greenlee County: Clifton, April, 1879, *A. Davidson 133* (G); San Francisco Mountains, near Clifton, April, 1881, *H. H. Rusby* (G). Maricopa County: Phoenix, March, 1897, *R. E. Kunze* (NY). Mohave County: near Kingman, June, 1893, *N. C. Wilson* (UC); mesa near Mellen, Feb., 1910, *J. Grinnell* (UC); Mica Spring, March, 1894, *M. E. Jones 4053* (RM, US), *5045g*, *5051* (US); Yucca, May, 1884, *M. E. Jones 3885* (NY, T, US). Pima County: Loasa to Lavare, *via* Baboquivari,

D. Griffith 3601 (US); Santa Catalina Mountains, April, 1894, *J. W. Toumey 6* (G); same, April, 1895, *J. W. Toumey* (UC, NY); Sabina Canyon, near Tucson, April, 1896, *Myrtle Zuck* (NY, US); Santa Rita Range Reserve, May, 1912, *E. O. Wooton* (US); Tucson Mountains, April, 1892, *J. W. Toumey 571* (B, NY, UC, US); Tucson, spring, 1907, *F. E. Lloyd* (G); same, 1876, *E. Palmer 582* (US). Yavapai County: Walnut Grove, April, 1876, *E. Palmer 86* (G, US). County not given: Agua Verde Creek, April, 1914, *J. A. Harris C14153* (US); Beaver Dam, 1877, *E. Palmer 85* (G); Diamond Creek Canyon, April, 1893, *N. C. Wilson* (UC); 1884, *J. G. Lemmon 39* (G).

NEVADA. Clark County: El Dorado Canyon, April, 1919, *I. Tidestrom 8758* (CPS, US).

CALIFORNIA. Riverside County: Chuchawalla Springs, April, 1905, *H. M. Hall 5891* (B, UC); Cottonwood Springs, May, 1916, *S. B. Parish 10851* (UC); Mecca, May, 1916, *S. B. Parish 10862* (G); Palm Springs, April, 1919, *A. J. Perkins* (CPS); Riverside Mountains, Colorado River, March, 1910, *J. Grinnell* (UC). San Bernardino County: Mojave River, May, 1884, *E. Palmer 96* (G); the Needles, May, 1884, *M. E. Jones* (NY); San Bernardino, 1880, *J. G. Lemmon 35* (G).

SONORA. Magdalena, April, 1910, *J. N. Rose, P. C. Standley & P. G. Russell 15090* (US).

2*c*. **Lupinus sparsiflorus setosissimus** var. nov. [FIG. 56.]

A *L. sparsifloro* typico differt caule crasso fistulosoque, foliolis lanceolati-linearis longissimis: caule subhirsuto erecto; racemo 8–20 cm. longo, floribus 10 mm. longis, pedicellis 3–5 mm. longis; calyce bracteolato, bracteolis filiformis, 2 mm. longis, labio superiore bifido, inferiore tridentato; vexillo 10 mm. longo, 9 mm. lato, carina prope ungue subter ciliata.

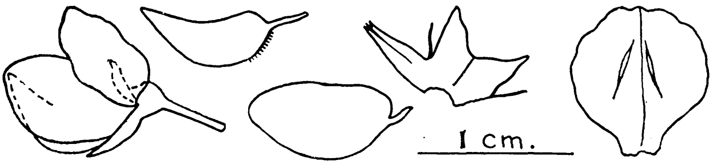

FIG. 56. LUPINUS SPARSIFLORUS SETOSISSIMUS C. P. Smith. *Dr. Streets* (US 21077).

Simple, 2–4 dm. tall, well-provided with stiff spreading hairs, stout and fistulose; basal leaves largest, the cauline few and poorly developed, petioles up to 8 cm. long, leaflets lance-linear, 3–4 cm. long, 3–4 mm. wide; raceme 8–12 cm. long in flower, elongating in fruit, flowers 10 mm. long, bracts subpersistent, setaceous, 4–8 mm. long, pedicels 3–5 mm. long, densely appressed-pubescent; calyx bracteolate, the bractlets 2 mm. long, filiform, upper lip bifid, 4 mm. long, lower three-toothed, 5 mm. long; petals pale lilac or purplish, banner 10 mm. long, 9 mm. wide, wings 9 x 5 mm., keel ciliate below near claw, the point upturned; pods and seeds unknown.

LOWER CALIFORNIA. 1875, *Dr. Streets, U. S. Navy* (TYPE, US 21077).

A rather pronounced variation, not matched by any other specimens seen by me and unfortunately not well labelled. The name is not my own selection, but was applied to the sheet by someone whose handwriting I was unable to get identified. It evidently was suggested by the conspicuous stiff hairs.

2*d*. **Lupinus sparsiflorus barbatulus** Thornber, var. nov. [FIG. 57.]

A *L. sparsifloro* typico differt caule plus minusve fistuloso, foliolis 7–9, oblanceolatis, maximis 6–12 mm. latis; caule erecto; racemo 10–30 cm. longo, floribus 10–11 mm. longis; calyce plurimum ebracteolato, labio superiore bifido, inferiore tridentato; vexillo prope 10 x 10 mm., carina ad basin subter ciliata.

Erect, 3–5 dm. tall, fistulose or succulent, simple or with a few branches, appressed-pubescent and with few or many stiffish spreading hairs; leaflets seven to nine, oblanceolate, glabrous or subglabrous above, 2–3 cm. long, 6–12 mm. wide, broadest near the angled apex; peduncles 6–8 cm. long, racemes 10–15 cm. or more long, flowers scattered, 10–11 mm. long, bracts semi-persistent, filiform, stiff-hairy, exceeding the buds, pedicels 3–4 mm. long; calyx usually ebracteolate, upper lip bifid, 4–5 mm. long, the lobes 1–2 mm. wide at base, lower lip three-toothed, 4–7 mm. long, about 2 mm. wide; petals pale lilac or purplish, banner orbicular, about 10 x 10 mm., wings 9–10 mm. long, 5–6 mm. wide, keel ciliate on free edges below near claw, nearly straight or with the point decidedly upturned.

ARIZONA. County not given: valley of the Colorado, March, 1876, *E. Palmer 88* (TYPE, US 20666; type-duplicates, T, UC 82181).

CALIFORNIA. Riverside County: Painted Canyon, northeast of Mecca, March, 1917, *E. A. McGregor 725* (CPS); Palm Springs (Agua Caliente), April, 1896, *S. B. Parish 4080* (UC); Palm Springs, April, 1905, *H. M. Hall 5759* (B); same, April, 1906, *G. B. Grant 6783* (UC); same, May, 1906, *G. B. Grant 723* (B); western borders of Colorado Desert, April, 1907, *S. B. Parish 6152* (B). San Bernardino County: the Needles, March, 1915, *S. B. Parish* (UC). San Diego County: Colorado Desert, April, 1905, *T. S. Brandegee* (US 735442); San Filipe Creek, April, 1901, *T. S. Brandegee* (UC).

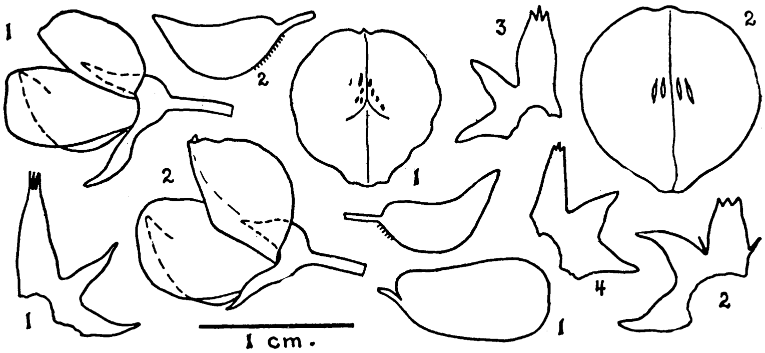

FIG. 57. LUPINUS SPARSIFLORUS BARBATULUS Thornber. 1. *E. Palmer 88* (US) 2. *E. A. McGregor 725* (CPS); 3. *E. Palmer 586* (US); 4. *E. Palmer 595* (US)

LOWER CALIFORNIA. Cabo San Lucas, Nov., 1902, *T. S. Brandegee* (UC); Lagoon Head, March, 1889, *E. Palmer, 797* (G, T, UC); La Palmia, March, 1892, *T. S. Brandegee* (G); Los Angeles Bay, 1887, *E. Palmer 586* (US 20937), *595* (G, US); Palmilla, Jan.-March, 1901, *C. A. Purpus 343* (UC); Punta Gorda, April, 1892, *T. S. Brandegee 117* (G, US); San Ignacio, April, 1889, *T. S. Brandegee* (UC); San Jose del Cabo, Nov., 1898, *T. S. Brandegee* (UC); same, Nov., 1902, *T. S. Brandegee* (UC); Sierra de la Laguna, Jan., 1890, *T. S. Brandegee 117* (UC).

Some time ago, while at the National Herbarium, J. J. Thornber picked out E. Palmer's "Arizona" and "Los Angeles Bay" specimens (US), cited above, and annotated the sheets to indicate a new species, designating the "Arizona" specimen as the type and applying the name here accepted and accredited to him. I at first readily accepted Professor Thornber's separation as a good species; but as my studies continued and my conception of *L. sparsiflorus*, *sensu lato*, developed, I was forced to acknowledge the very close relationship of this new form to the typical *L. sparsiflorus*. Intermediates connect it with at least three of the varieties here recognized.

Barbatulus is Latin, diminutive of *barbatus*, "bearded."

2e. **Lupinus sparsiflorus insignitus** var. nov. [FIG. 58.]

A var. *barbatulo* differt foliolis plerumque 5 solum, ellipticis, ad medium latissimis: planta subglabra vel superne brevi-villosa; racemo 7–15 mm. longo, floribus 12 mm. longis; calyce ebracteolato, labio superiore bifido, inferiore tridentato; vexillo 11 mm. longo, 10 mm. lato, carina prope ungue subter ciliata.

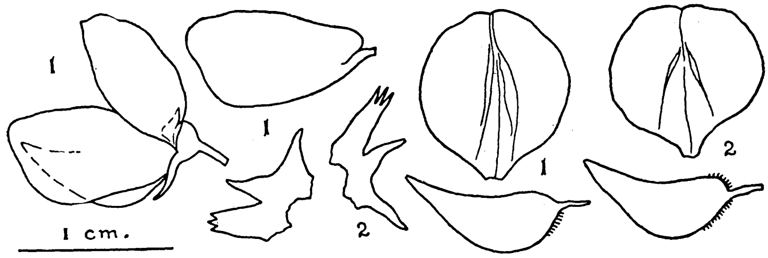

FIG. 58. LUPINUS SPARSIFLORUS INSIGNITUS C. P. Smith. 1. *T. S. Brandegee* (UC 198527); 2. *C. Grabendorffer* (UC 198314).

Very similar to var. *barbatulus* but with the leaflets usually five only (four to six) and broadest near the middle, the pubescence scant and appressed or plentiful and short-spreading in the upper parts: pods ascending, 15 mm. long, 4 mm. wide, five- to six-seeded; seeds about 2 x 1.7 mm., lateral aspect marbled with olive or brown on a light tan ground.

LOWER CALIFORNIA. Santa Margarita Island, March, 1889, *T. S. Brandegee* (TYPE, UC 198527); San Jose del Cabo, 1898, *Carlos Grabendorffer* (UC 198314).

2f. **Lupinus sparsiflorus inopinatus** var. nov. [FIG. 59.]

A *L. sparsifloro* typico differt foliolis apice truncatis emarginatis vel minute tridentatis; caule ramoso prope medium; racemo 7–15 cm. longo, floribus prope 12 mm. longis, pedicellis 3 mm. longis; calyce ebracteolato, labio superiore bifido, inferiore tridentato; vexillo plurimum contracto, ungue prope 10 mm. longo, 8 mm. lato, carina plurimum recta prope ungue ciliata.

Slender, branched about the middle, with some spreading hairs, 3–5 dm. tall; leaflets linear-oblanceolate, rounded or truncate at apex, entire, notched, emarginate, or minutely three-toothed; peduncles short, racemes 6–15 cm. long, flowers about 12 mm. long, pedicels about 3 mm., scattered; calyx ebracteolate, upper lip bifid, some 4 mm. long, lower lip three-toothed, 5–6 mm. long; petals seemingly purplish, banner rather abruptly narrowed into a distinct claw, about 10 mm. long and 8 mm. wide, wings 10 x 6 mm., keel 10 mm. long, straight, ciliate below and more or less above near the claw: pods and seeds not seen.

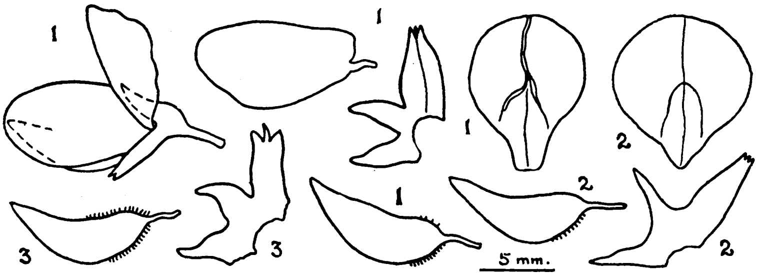

FIG. 59. LUPINUS SPARSIFLORUS INOPINATUS C. P. Smith. 1. *T. S. Brandegee* (UC 444311); 2. *H. M. Hall 3011* (UC); 3. *H. M. Hall 4946* (UC).

CALIFORNIA. Riverside County: Riverside, Fairmount Park, May, 1904, *H. M. Hall 4946* (B, UC). San Bernardino County: Cajon Pass, April, 1902, *H. M. Hall 3011* (UC). San Diego County: San Diego, April, 1903, *T. S. Brandegee*, C. F. Baker's distribution 3411 (TYPE, US 444311; type-duplicates, B, G, NY, RM, UC); same, April, 1905, *K. Brandegee* (UC 198479, in part).

LOWER CALIFORNIA. Arroyo Calmalti, Jan.-March, 1898, *C. A. Purpus 106* (UC); Burro Canyon, April, 1893, *T. S. Brandegee* (UC); hills, April, 1882, *E. Palmer 25* (T); San Gregorio, Feb., 1889, *T. S. Brandegee* (UC); San Quentin Bay, Feb., 1889, *E. Palmer 807* (T); San Sebastean, April, 1889, *T. S. Brandegee* (UC).

The type collection is labelled, "*L. gracilis* Agardh, det. E. L. G." The type sheet is corrected to "*L. sparsiflorus*" by

"L. R. A." and was in the *L. Pondii* cover when first noticed by me. It is likely to be mistaken for *L. truncatus* Benth.

Inopinatus is Latin, used here in the sense of "unexpected."

2g. **Lupinus sparsiflorus Pondii** (Greene) comb. nov. [FIG. 60.]
Lupinus Pondii Greene, Pittonia 1: 288. 1899.

Stems branched from the base, 1–3 dm. tall, slender, spreading hairs few to very numerous and stiff; leaflets cuneate-oblong, truncate or notched at the apex, the largest 10–12 mm. long, 2–2.5 mm. wide near apex; peduncles very short, the racemes nearly sessile, 2–8 cm. long, rather densely flowered, flowers 10–12 mm. long, pedicels about 4 mm. long; calyx usually ebracteolate, upper lip bifid, about 4 mm. long, lower lip three-toothed, 5–7 mm. long; petals probably purplish when fresh, banner suborbicular, about 10 x 10 mm., wings about 10 x 6 mm., keel 9–10 mm. long, 3 mm. wide, the point somewhat upturned, the free edges ciliate below and more or less also above near claw; pods 12–14 mm. long, ovules four or five, seeds about 2 mm. long, smooth, dotted and marbled.

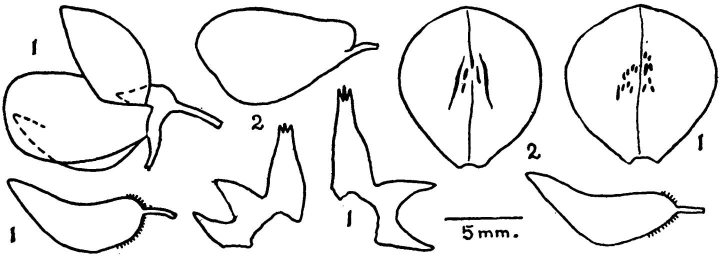

FIG. 60. LUPINUS SPARSIFLORUS PONDII (Greene) C. P. Smith. 1. *A. W. Anthony 284* (US 669752); 2. *J. N. Rose 16157* (US).

LOWER CALIFORNIA. Aliso, May, 1893, *T. S. Brandegee* (UC); Cedros Island, March-June, 1897, *A. W. Anthony 284* (G, RM, UC, US); same, April, 1897, *T. S. Brandegee* (UC); same, March, 1889, *E. Palmer 721* (G, T, US); same, March, 1911, *J. N. Rose 16157* (NY, US), *16221* (US); El Campo Aleman, April, 1889, *T. S. Brandegee* (UC); El Rosario, 1889, *T. S. Brandegee* (UC); Ensenada, 1889, *T. S. Brandegee* (UC); Las Palmas, April, 1893, *T. S. Brandegee* (UC); Los Angeles Bay Mountains, 1887, *E. Palmer 586* (G); San Bartolomei Bay, March, 1889, *Lieut. Pond* (UC, scrap of TYPE); San Enrique, 1889, *T. S. Brandegee* (UC);

San Felipe, Feb., 1901, *C. Grabendorffer* (UC); San Martin Island, March, 1897, *T. S. Brandegee* (UC); San Quentin, 1889, *E. Palmer 708* (G); San Telmo, May, 1890, *T. S. Brandegee* (UC); San Tomas, April, 1886, *C. R. Orcutt* (NY, UC); Temecala, March, 1882, *M. E. Jones* (G); Tia Juana, April, 1882, *C. R. Orcutt* (UC); locality not given, 1876, *E. Palmer 96* (NY).

CALIFORNIA. San Diego County: Coyote Canyon, Colorado Desert, April, 1902, *H. M. Hall 2821* (UC); Desella, April, 1903, *T. S. Brandegee* (UC).

3*a*. LUPINUS TRUNCATUS Nutt.; Hooker & Arnott, Bot. Beechey Voy. 336. 1840. [FIG. 61.]

Branched, 3–6 dm. tall, appressed-pubescent or practically glabrous; petioles usually flattened, sometimes widely margined, leaflets linear, five to seven, truncate, emarginate or two- to three-toothed at the apex, 20–40 mm. long, 2–3 mm. wide; racemes 6–15 cm. long, very lax and few-flowered; flowers spreading or somewhat drooping after anthesis, 10–12 mm. long, pedicels 2–3 mm. long, bracts usually persistent, lanceolate, 2–3 mm. long; calyx commonly ebracteolate, upper lip bifid, 2–2.5 mm. long, lower lip entire and acute or minutely three-toothed, 4 mm. long; petals more or less dark purple, banner about 10 mm. long, 9 mm. wide, abruptly contracted into an evident claw, wings about 8 x 5 mm., keel some 8 mm. long, the short stout blunt point upturned, the free edges below more or less ciliate, and densely ciliate above from near the base of the point to near the claw; pods more or less spreading, about 30 mm. long and 5–6 mm. wide, with spreading hairs 1–2 mm. long, ovules six or seven; seeds rhomboid, plump, about 3 x 2.5 mm. in side-view, pale flesh-color with obscure markings of a darker tint, or densely marbled with dark brown.

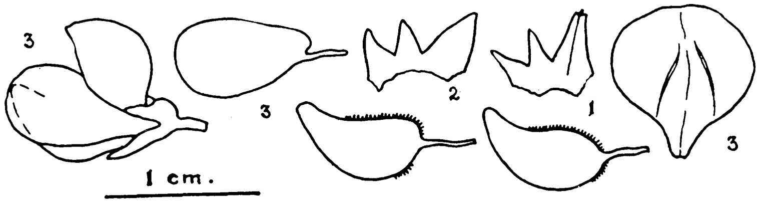

FIG. 61. LUPINUS TRUNCATUS Nutt. 1. *O. W. Knight 6989* (G); 2. *C. P. Smith 2855* (CPS); 3. *C. P. Smith 1446* (CPS).

This is a well defined species. Though superficially resembling *L. sparsiflorus inopinatus*, the two can be easily distinguished from each other. *L. truncatus* has the pubescence scant and appressed, the petioles flattened, the flowers spreading or subdrooping after anthesis, and the keel densely ciliate above; while the other has some spreading pubescence, normal petioles, flowers suberect soon after anthesis, and the keel naked or nearly so above. San Diego is the type locality of both.

CALIFORNIA. Kern County: Fort Mojave, 1860–61, *J. G. Cooper* (US). Los Angeles County: Antelope Valley, Ells, May, 1896, *J. B. Davy 2606* (UC); Azuza, San Gabriel Wash, March, 1906, *J. Grinnell* (US); Claremont, April, 1904, *C. F. Baker 4191*, *4192* (UC); same, April, 1909, *C. F. Baker 5302* (NY, US); Los Angeles, 1880, *J. C. Nevin* (G); same, June, 1904, *Los Angeles High School pupils* (UC); same, Feb., 1920, *F. E. Burlew* (CPS); Pasadena, May, 1904, *G. B. Grant* (UC); San Clemente Island, June, 1903, *B. Trask 257* (NY, US); Santa Catalina Island, May, 1897, *B. Trask* (US); same, May, 1899, *B. Trask* (NY); same, June, 1908, *H. M. Hall 8287* (UC); same, May, 1916, *K. Brandegee* (UC); Santa Monica, May, 1885, *A. Gray* (G); Santa Monica Mountains, April, 1901, *L. R. Abrams 1299* (NY); Sierra Madre, June, 1914, *C. P. Smith 2855* (CPS); Soldiers Home, March, 1897, *J. H. Barber 295* (UC); open grounds and hillsides, May, 1891, *H. E. Hasse* (US); locality not given, April, 1901, *G. B. Grant 3959* (US). Monterey County: Burros, April, 1912, *I. J. Condit* (UC); Monterey, April, 1900, *A. Eastwood* (G); Pacific Grove, June, 1893, *I. Tidestrom* (UC); same, May, 1901, *Mrs. Wright* (UC); same, April, 1903, *A. A. Heller 6637* (G, NY, UC, US); same, May, 1907, *C. P. Smith 1334* (CPS); same, June, 1908, *C. P. Smith 1446* (CPS). Riverside County: Elsinore, March, 1892, *A. J. McClatchie* (NY); Menifee, 1893, *M. A. King* (UC); Moorpark, April, 1912, *E. O. Wooton* (US); Mount Ruleidoux, April, 1913, *R. L. Piemeisel 3436* (US). San Bernardino County: Mentone, April, 1898, *J. B. Leiberg 3292* (US); San Bernardino, May, 1880, *G. R. Vasey 98* (US); same, April, 1881, *W. R. Wright 232* (G); same, March, 1901, *S. B. Parish 4655* (NY) and *4656* (US); San Bernardino foothills, May, 1885, *S. B. & W. F. Parish 69* (UC, US); same, April, 1888, *S. B. & W. F. Parish* (UC); same, May, 1898, *S. B. Parish* (NY); San Bernardino Mountains, Waterman Canyon, June, 1894, *S. B. Parish 3494* (US); San

Bernardino Valley mesas, April, 1908, *S. B. Parish 6928* (UC). San Diego County: Coahuilla foothills, April, 1902, *H. M. Hall 2898* (G, UC, US); Colorado Desert, *A. F. Schott* (US); Dulzura, 1903, *Mr. Valentine* (UC); Fallbrook hills, April, 1903, *L. R, Abrams 3313* (G, NY, US); La Jolla, Rose Canyon, March, 1914, *F. E. & E. S. Clements 151* (G); Lakeside, May, 1889, *T. S. Brandegee* (NY, UC); Lemon Grove road, May, 1904, *H. P. Chandler 5285* (NY); Ocean Beach, May, 1902, *T. S. Brandegee*, Baker's distribution 1602 (G, NY, UC, US); San Diego, May, 1852, *G. Thurber* (G, NY, T); same, March, 1850, *C. C. Parry* (T); same, March, 1892, *O. W. Knight* (G); same, 1904, *T. S. Brandegee* (US); same, May, 1905, *K. Brandegee* (UC); same, April, 1916, *M. F. Spencer 99* (US); San Diego, North Island, May, 1911, *K. Brandegee* (UC); San Ysabel, April, 1893, *H. W. Henshaw 102* (T, US); Sweetwater Valley, April, 1883, and May, 1888, *G. C. Deane* G); Tighes Ranch, 1875, *E. Palmer 53* (G); Witch Creek, April, 1894, *R. D. Alderson.* San Luis Obispo County: Arroyo Grande, April, 1895, *Alice King* (UC); Edno sand dunes, May, 1905, *J. E. Roadhouse 352* (UC); Santa Lucia Mountains, rocky ravines, March, 1883, *Mrs. R. W. Summers* (G, US); San Luis Mountain, March, 1883, *Rev. R. W. Summers 165* (UC); same, April, 1886, *Mrs. R. W. Summers* (NY); locality not given, April, 1892, *L. Jared* (UC). Santa Barbara County. Alamo Creek, May, 1896, *A. Eastwood* (G); Santa Inez Mountains, April, 1861, *W. H. Brewer 341* (US); Dos Pueblos, Santa Inez, *W. H. Brewer 345* (G); Dos Pueblos, near Gaviote Pass, *W. H. Brewer 385* (G, US); Santa Barbara, May, 1902, *A. D. E. Elmer 4156* (US); Santa Cruz Island, April, 1888, *T. S. Brandegee* (UC). Ventura County: Ojai and vicinity, April, 1866, *S. F. Peckham* (US); Ojai Valley, April, 1896, *F. W. Hubby* (UC), specimens without data, *Douglas, Wallace & Coulter* (G).

LOWER CALIFORNIA. Hills, April, 1882, *C. G. Pringle* (T, US); Nachoguero Valley, June, 1894, *E. A. Mearns*, International Boundary Commission, No. 3496 (US); San Pedro Martin, May, 1893, *T. S. Brandegee* (UC); San Quentin Bay, Jan., 1889, *E. Palmer 636* (G, T, US); Tecabe, July, 1884, *C. R. Orcutt 1096* (G); Todos Santos Island, March, 1897, *T. S. Brandegee* (UC).

3*b*. **Lupinus truncatus Burlewi** var. nov. [FIG. 62.]

A *L. truncato* typico differt floribus minoribus, labio inferiore breviore tridentato 2–3 mm. longo, petalis pallidis, vexillo 8 mm. longo 6 mm. lato, carina subviride recta, 6–7 mm. longa; fructus non vidi.

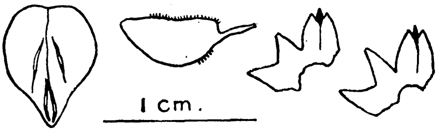

FIG. 62. LUPINUS TRUNCATUS BURLEWI C. P. Smith. *F. E. Burlew* (CPS).

This is a small- and pale-flowered variation, specimens of which have been recently forwarded to me by Mr. Geo. L. Moxley, of Los Angeles. Calyx bright green, lower lip distinctly three-toothed, petals almost devoid of purple, banner 8 x 6 mm., keel 6–7 mm. long, the point not upturned, noticeably greenish; fruit and seeds not seen.

CALIFORNIA. Los Angeles County: rolling hills, Los Angeles, Jan., 1920, *F. E. Burlew* (TYPE, CPS).

4*a*. LUPINUS BENTHAMI Heller, Muhlenbergia 2: 61. 1905. [FIG. 63.]

Lupinus leptophyllus Benth. Trans. Hort. Soc. II, 1: 141. 1835. Not *Lupinus leptophyllus* Schl. & Cham. Linnaea 5: 589. 1830.

Slender, 3–6 dm. tall, villous with spreading hairs about 1.5–2 mm. long; leaflets filiform, 20–50 mm. long, 1–2 mm. wide; racemes 10–20 cm. long; flowers 10–12 mm. long, bracts deciduous, linear-filiform, conspicuously spreading-villous, pedicels 3–6 mm.; upper lip of calyx bifid, the lobes lanceolate, widely divergent, about 5 mm. long, 1 mm. wide, lower lip three-toothed, slender, about 6 x 1 mm.; petals bluish purple, banner reddish purple in center, broadly obovate to orbicular, about 11 x 11 mm., wings about 12 x 6 cm., keel slender, curved, 11–12 mm. long, ciliate on free edges below only; pods 20–30 mm. long, three- or four-seeded; seeds about 2 mm. long, tawny, marbled with dark brown, hilar area unmarked.

CALIFORNIA. Amador County: New York Falls, April, 1896, *G. Hansen 17* (US). Calaveras County: Murphey's to Sheep Ranch, May, 1895, *J. B. Davy 1561* (G, UC); Angels Camp, wooded hillsides, May, 1895, *J. B. Davy 1463* (G, UC). El Dorado County: Coloma, June, 1892, *E. Palmer 2391* (US); Pilot Hill, June, 1908, and April, 1915, *K. Brandegee* (UC); Placerville, May, 1907, *K. Brandegee* (UC). Fresno County: Toll House, June, 1900, *Hall & Chandler 52* (UC). Kern County: Fort Tejon, 1857–8, *L. J. Xantus de Vesey 23* (G, US). Mariposa County: Mariposa Creek, April, 1903, *J. W. Congdon* (B); Pea Ridge road, June, 1883, April, 1901, and April, 1902, *J. W. Congdon* (US); same, April, 1903, *J. W. Congdon* (US 466505, left-hand specimen only). Monterey County: Stony Creek, Santa Lucia Mountains, May, 1897, *A. Eastwood* (G). Sacramento County: Folsom, April-June, 1883, *M. K. C.* (UC). Santa Barbara County: Alamo Creek, May, 1896, *A. Eastwood* (G). Tulare County: canyon above Grapevine Springs, April, 1898, *P. S. Woolsey* (G); Lemon Cove, May, *I. J. Condit* (UC); Three Rivers, May, 1894, *A. Eastwood* (G, UC). County not given: *J. M. Biglow* (G); *T. Bridges 58* (NY); 1891, *Mrs. E. P. Ames 31* (G).

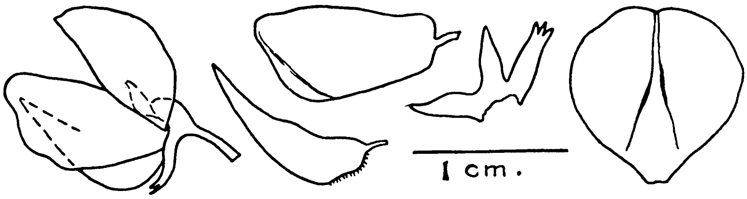

FIG. 63. LUPINUS BENTHAMI Heller. *J. W. Congdon* (US 466503).

This is a clean-cut species, easily distinguished from its nearest relatives. In more moist and richer soil it varies into a large robust form which seems to me to deserve recognition.

4*b*. **Lupinus Benthami opimus** var nov. [FIG. 64.]

A forma typica differt partibus omnibus grandioribus, pilis 2.5–3 mm. longis, caule paulo fistuloso, foliolis 2–3 mm. latis, longioribus, racemis 20–30 cm. longis, floribus 14–15 mm. longis, pedicellis 7–9 mm. longis, vexillo prope 14 mm. longo, 16 mm. lato, alis 14 x 10 mm., carina 14 mm. longa, curvatissima.

Differing from the typical form in all the parts being larger, excepting the calyx, hairs 2.5–3 mm. long, main stem more or less stout and fistulose; leaflets longer, 2–3 mm. wide; racemes 20–30 cm. long, flowers 14–15 mm. long, pedicels 7–9 mm. long; banner about 14 mm. long, 16 mm. wide, wings 14 x 10 mm., keel much curved, about 14 mm. long.

CALIFORNIA. Amador County: 1891, *G. Hansen* (UC). El Dorado County: Salmon Falls, May, 1909, *K. Brandegee* (UC). Kern County: Bakersfield, April-May, 1896, *J. B. Davy 1799* and *1926* (G, UC); Caliente, Walker's Basin grade, May, 1911, *K. Brandegee* (UC); Kern River bluffs, April, 1905, *A. A. Heller 7631* (B, NY, UC, US). Los Angeles County: Elizabeth Lake, Antelope Valley, May, 1896, *J. B. Davy 2654* (UC). Madera County: Pollasky, 11 April, 1906, *A. A. Heller 8136* (TYPE, B; type-duplicates, G, NY, US). Mariposa County: Pea Ridge road, April, 1903, *J. W. Congdon* (US 466505, right-hand specimen only). Placer County: Penryn, April, 1891, *C. F. Sonne* (UC). San Luis Obispo County: May, 1893, *Mrs. Blochman* (UC). Tulare County: Deer Creek, April, 1896, *C. A. Purpus 1703* (UC); Grapevine Springs, March, 1898, *P. S. Woolsey* (UC); Lindsay, March, 1897, *A. J. Hutchinson* (UC); hillsides, Middle Tule River, April-Sept., 1897, *C. A. Purpus 5671* (G, UC, US).

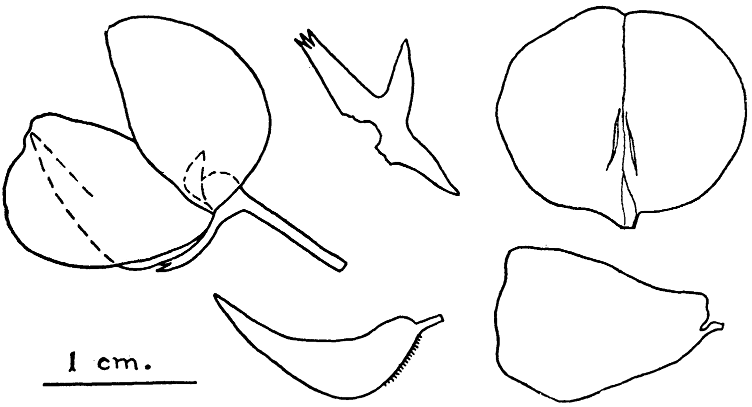

FIG. 64. LUPINUS BENTHAMI OPIMUS C. P. Smith. *A. A. Heller 8136* (US).

Opimus is Latin, here used in the sense of both "corpulent" and "splendid." Apparently this classification will care for a large majority of the specimens, very few real intermediates being evident.

5. LUPINUS CITRINUS Kellogg, Proc. Cal. Acad. Sci. 7: 93. 1877. [FIG. 65.]

Mostly 10–20 cm. tall, branched from the base, short-hairy; leaflets six to eight, oblanceolate, 15–20 mm. long, 2–4 mm. wide;

racemes 10–15 cm. long; flowers spreading in anthesis but soon deflexing, pedicels 3 mm. long, with spreading hairs; calyx with spreading hairs, upper lip bifid, its lobes about 3 mm. long and 2 mm. wide at base, lower lip minutely three-toothed, about 3–4 mm. long, 2 mm. wide; petals bright orange or golden, banner orbicular, emarginate, about 9 x 9 mm., wings 10 x 6 mm., keel nearly straight, ciliate on the lower free edges near claw; pods deflexed, practically glabrous, 12–15 mm. long, about 3 mm. wide, two- to four-seeded; seeds rhomboid, black-spotted on a pale ground, about 2 mm. long.

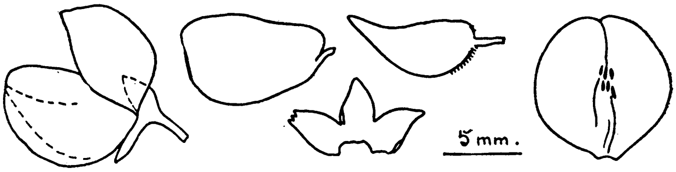

FIG. 65. LUPINUS CITRINUS Kellogg. *J. W. Congdon* (B).

CALIFORNIA. Fresno County: Pine Ridge, June, 1900, *Hall & Chandler 119* (NY, UC); Toll House hill, May 1903, *J. W. Congdon* (B, UC).

Seemingly known only from Fresno County, where it was originally collected by E. Eisen. Kellogg refers to the keel as "naked," a character not supported by my findings in the case of the one dissection made by me; hence study of additional material is desirable.

6. LUPINUS DEFLEXUS Congdon, Muhlenbergia 1: 38. 1904. [FIG. 66.]

About 20–40 cm. tall, simple or branched from the base, pubescent, becoming glabrate; leaflets oblanceolate, about seven, 15–25 mm. long, 3–5 mm. wide; racemes 6–20 cm. long; flowers spreading in anthesis, soon deflexing; pedicels 3–4 mm. long; calyx with spreading hairs, the upper lip two-lobed, the lobes

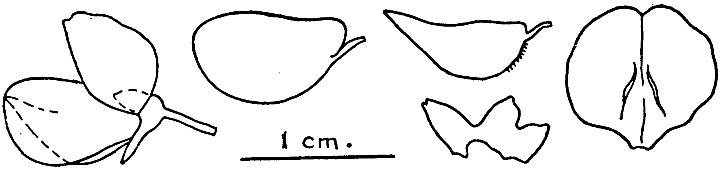

FIG. 66. LUPINUS DEFLEXUS Congdon. *J. W. Congdon* (US 466500).

about 2 mm. broad, lower lip two- or three-toothed, 2 mm. wide, 4 mm. long; petals dull white or pinkish, banner suborbicular, emarginate at apex, about 10 x 10 mm., wings 10 x 6 mm., keel 9–10 mm. long, nearly straight, ciliate on the lower edges near the claw; pods about 20 mm. long, about 3 mm. wide, five- to eight-seeded, deflexed; seeds 2 mm. in diameter, smooth, unspotted, dull.

CALIFORNIA. Mariposa County: Mariposa Creek, near Mariposa, April, 1903, *J. W. Congdon* (B, G, UC); same, May, 1903, *J. W. Congdon* (B, G, UC, US).

Apparently confined to the type locality and collected by no one other than Mr. Congdon. Its nearest relative is *L. citrinus*.

In the citation of specimens the following abbreviations have been used in the present paper:

B, Brooklyn Botanic Garden;

CPS, private collection of the writer;

G, Gray Herbarium of Harvard University;

NY, New York Botanical Garden;

RM, Rocky Mountain Herbarium, University of Wyoming;

T, Torrey Herbarium (at New York Botanical Garden);

UC, University of California;

US, United States National Herbarium.